

07-29-'04 12:35 FROM-Lerner & Greenberg +9549251101
Appl. No. 10/646,218
Amdt. dated July 29, 2004
Reply to Office action of June 17, 2004

T-082 P06/10 U-545

REMARKS/ARGUMENTS

Reconsideration of the application is requested.

Claims 1-5 remain in the application. Claims 1 and 5 have been amended.

More specifically, claim 1 has been amended in an effort to even more clearly and unambiguously define the invention. In particular, we have emphasized the fact that the first conductive structure remains entirely covered with the diffusion barrier layer during the etching step. As will be pointed out in the following, this is crucially important with regard to the rejection.

Claim 5 has been amended by changing its dependency to claim 3. The amendment to claim 5 should overcome the claim objection at the top of page 2 of the detailed action.

With regard to the claim rejection under 35 U.S.C. § 101, applicant will in time cancel claims 7-11 of copending Application Number 09/816,923. The proposed cancellation will then moot the § 101 rejection.

We now turn to the art rejection in which claims 1, 3, and 5 have been rejected as being anticipated by Mu (U.S. 5,612,254,

Appl. No. 10/646,218

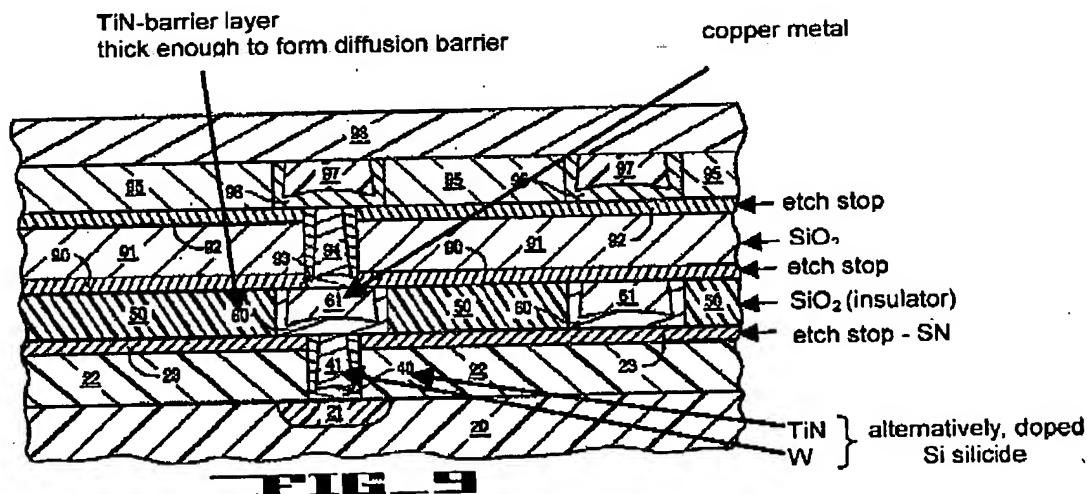
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hereinafter "Mu") under 35 U.S.C. § 102(b). We respectfully traverse.

The Examiner's careful review of the reference Mu and the detailed explanation of the underlying factual understanding are appreciated. We agree with most of the Examiner's findings but, as will be pointed out in the following, the Examiner overlooks a crucial difference between the reference Mu and the claimed invention.

As noted above, the fact that the first conductive structure remains covered with the diffusion barrier layer is a clear and unambiguous distinction over the reference Mu and in particular the etch stop layer 90 of Mu.



As seen from the copy of Mu's Fig. 9, the layer 90 is an etch stop. We do not disagree with the Examiner that an etch stop

Appl. No. 10/646,218

Amdt. dated July 29, 2004

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layer may in some respects also be called a "diffusion barrier layer." In the instant case, however, Mu refers to the layer 90 as an "etch stop" for good reasons. The layer 90 in fact will form a barrier against etching the underlying structures everywhere but at the location of the conductive structure. In fact, the Examiner's statement in the middle of page 3, according to which Mu teaches "etching a contact hole . . . wherein a surface of the first conductive structure is covered with the diffusion barrier layer within the hole" is patently incorrect. The layer 90 instead is an etch stop which must be open. If the layer 90 were not open at the conductive structure, the hole could not possibly be etched.

Accordingly, Mu does not anticipate claim 1. While the distinction appeared in the previously presented claim 1, the above amendment emphasizes the distinction to such a degree as to entirely and unambiguously disqualify Mu.

The foregoing statements are not simply based on counsel's reading of Mu but they are expressly delineated in the patent specification. Mu states the following:

- 1) the tungsten, heavily doped polysilicon, or silicide is a diffusion barrier to a subsequently deposited metal layer or 2) a barrier layer is deposited over the tungsten, the heavily doped polysilicon, or the silicide before depositing a metal layer.

Appl. No. 10/646,218
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Mu et al., col. 6, lines 29-33.

A second silicon nitride layer 90, a second silicon dioxide layer 91, and a third silicon nitride layer 92 are deposited over the substrate.

Mu et al., col. 8, lines 41-43.

A second titanium nitride layer 93 and a second tungsten layer 94 are deposited and anisotropically etched to form a via plug within the via opening. Formation of the via opening and the via plug is similar to the formation of the contact opening and the contact plug.

Mu et al., col. 9, lines 45-19.

The third silicon nitride layer 92 acts as an etch stop during the formation of the second level interconnect channels.

Mu et al., col. 8, lines 54-56.

The Examiner will surely agree that Mu does not anticipate the method of claim 1. In light of the above-summarized teachings of Mu, it is found that the patent can also not be used as a proper primary reference in the rejection under 35 U.S.C. § 103. There, the Examiner rejected claim 2 as being obvious over Mu in view of Ting et al. (U.S. 5,969,422).

While Ting is acknowledged, Ting does not make up for the shortcomings of the primary reference Mu. There is nothing in Ting which would modify Mu towards keeping a first conductive structure covered with the layer 90 during a following etching process. In fact, of course, such a modification would destroy

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the very teaching of Mu and it would render the Mu process
entirely dysfunctional.

In summary, neither Mu nor any of the references of record
whether taken alone or in combination, either show or suggest
the features of claim 1. Claim 1 is, therefore, believed to be
patentable over the art and since all of the dependent claims
are ultimately dependent on claim 1, they are believed to be
patentable as well.

In view of the foregoing, reconsideration and allowance of
claims 1-5 are solicited.

Respectfully submitted,



For Applicant

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